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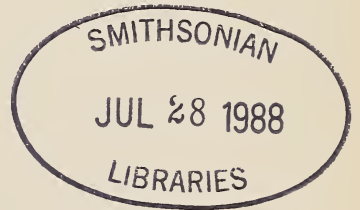
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FISCHER, P. H., DUVAL, M. & RAFFY, A. 1933. Études sur les échanges respiratoires des littorines. *Archives de zoologie expérimentale et générale* 74 (33): 627–634.
KOHN, A. J. 1960a. Ecological notes on *Conus* (Mollusca: Gastropoda) in the Trincomalee region of Ceylon. *Annals and Magazine of Natural History* (13) 2 (17): 309–320.
KOHN, A. J. 1960b. Spawning behaviour, egg masses and larval development in *Conus* from the Indian Ocean. *Bulletin of the Bingham Oceanographic Collection, Yale University* 17 (4): 1–51.
THIELE, J. 1910. Mollusca. B. Polyplacophora, Gastropoda marina, Bivalvia. In: SCHULTZE, L. *Zoologische und anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Süd-Afrika ausgeführt in den Jahren 1903–1905* 4 (15). *Denkschriften der medizinisch-naturwissenschaftlichen Gesellschaft zu Jena* 16: 269–270.

(continued inside back cover)

ANNALS OF THE SOUTH AFRICAN MUSEUM
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SOUTH AFRICAN SPECIES OF THE GENUS
GERYON (CRUSTACEA, DECAPODA,
GERYONIDAE)

By

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&

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Cape Town

Kaapstad

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SOUTH AFRICAN SPECIES OF THE GENUS *GERYON*
(CRUSTACEA, DECAPODA, GERYONIDAE)

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(With 6 figures)

[MS accepted 2 July 1987]

ABSTRACT

Three species of *Geryon* are recorded from South West Africa–Namibia and South Africa: *G. chuni* Macpherson, *G. macphersoni* sp. nov., and *G. maritae* Manning & Holthuis. *Geryon ischurodous* Stebbing is shown to be a species of *Carcinoplax*.

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INTRODUCTION

Until recently, three species of *Geryon* had been reported from South African waters, *Geryon quinquedens* Smith (1879: 35), *G. ischurodous* Stebbing (1923: 2), and *G. maritae* Manning & Holthuis (1981: 112), with most authors identifying material from South Africa with the American *G. quinquedens*. Also until relatively recently, many authors had identified material of *Geryon* from a wide variety of localities with either *G. affinis* A. Milne Edwards & Bouvier, 1894, originally named from the north-eastern Atlantic, or *G. quinquedens* Smith, described from the north-western Atlantic. In spite of the fact that A. Milne Edwards & Bouvier (1894: 41–45) and Chace (1940: 38–40) showed that *G. affinis* differed from *G. quinquedens* in having the dactyli of the walking legs laterally compressed rather than dorso-ventrally depressed, some authors, including Barnard (1950), considered the two species to be conspecific. Even those who recognized the differences in the structure of the dactyl considered

G. affinis to be widely distributed around the world. Thus *G. affinis* has been recorded from the western Atlantic (Chace 1940), Japan (Sakai 1978), Australia (Griffin & Brown 1976), and East Africa and the Valdivia Bank (Doflein 1904).

Manning & Holthuis (1981), in a review of the West African crabs, described *G. maritae*, the first of six species of *Geryon* to be recognized in this decade. The others are: *G. chuni* Macpherson (1983: 23), from South West Africa–Namibia; *G. fenneri* Manning & Holthuis (1984: 666), from localities off Florida, U.S.A.; *G. erythrae* Macpherson (1984: 86), from the Valdivia Bank; *G. gordonae* Ingle (1985: 90), from the north-eastern Atlantic; and *G. inghami* Manning & Holthuis (1986: 366), from Bermuda.

As part of a long-term study of the genus *Geryon*, material of this genus in the collections of the South African Museum was examined. The results of that study are presented here.

The following abbreviations are used in the text: cb—carapace breadth; cl—carapace length; fm—fathom; m—metre; mm—millimetre. Repositories have been identified by the following abbreviations: BM—British Museum (Natural History), London; ICM—Instituto de Ciencias del Mar, Barcelona; MNHP—Muséum national d'Histoire naturelle, Paris; RMNH—Rijksmuseum van Natuurlijke Historie, Leiden; SAM—South African Museum, Cape Town; USNM—National Museum of Natural History, Smithsonian Institution, Washington; ZMC—Zoological Museum, Copenhagen.

Co-ordinates in the text given in square brackets have been taken from gazetteers of the United States Board on Geographic Names.

THE STATUS OF *GERYON ISCHURODOUS* STEBBING, 1923

Geryon ischurodous was described by Stebbing (1923: 2) from a single specimen, cl 16 mm, cb 26 mm, taken from coral washed up on a beach at Durban. No additional material identified with this species has been recorded in the literature since then, and its status has remained uncertain. Barnard (1950: 293) commented on similarities between Stebbing's species and *Geryon trispinosus* (Herbst). He concluded that 'There seems to be little doubt that *ischurodous* should become a synonym of *trispinosus*'.

Among the material of *Geryon* examined from the collections of the South African Museum was a single small specimen taken off Natal in 700–680 m and reported by Kensley (1977: 163) as *Geryon* sp. It proved to be identifiable with *Geryon ischurodous* Stebbing.

In our opinion, Stebbing's species did not belong in the genus *Geryon*. In seeking to place it in another genus, we looked through a variety of accounts of deep-sea crabs in the literature. Among these sources was the recent account by Guinot & Richer de Forges (1981a, 1981b) of deep-sea crabs from the Indo-Pacific. The similarity between the South African material of *Geryon ischurodous* and a species taken in 600 m off the New Hebrides and described by Guinot & Richer de Forges as *Carcinoplax eurysternum* was immediately recognized.



Fig. 1. *Carcinoplax ischurodous* (Stebbing), Natal. Male, cl 4,1 mm.

Guinot & Richer de Forges (1981*b*: 251) pointed out that few species of *Carcinoplax* have only two teeth on the anterolateral margin of the carapace, and that few species have one of these teeth as an exorbital spine. *Geryon ischurodous* has but two anterolateral teeth on the carapace, and one of these is a well-developed exorbital tooth (Fig. 1). Further, the figures of *C. eurysternum* provided by Guinot & Richer de Forges show a species with an inner spine on the merus of the cheliped and an inner and outer spine on the carpus of the cheliped, with the inner carpal spine bifurcate. The southern African specimens are similarly spined and, although the smaller lacks the secondary spine on the inner carpal spine, it is clearly shown on the type by Stebbing (1923, pl. 11). However, the gonopods of the two species are slightly different—compare Stebbing's figure (1923, pl. 11, plp.2) with that of Guinot & Richer de Forges (1981*b*, fig. 10H), and the shape of the carapace is somewhat different in the two nominal species, being broader in *C. eurysternum*.

Comparison of the specimen from off Natal and the type of *Geryon ischurodous* with the original account of *Carcinoplax eurysternum* convinces us that these three specimens are very closely related and that *Carcinoplax eurysternum* Guinot & Richer de Forges, 1981, may prove to be a junior synonym of *Geryon ischurodous* Stebbing, 1923. The correct name for Stebbing's species is *Carcinoplax ischurodous* (Stebbing, 1923).

We have examined the following specimens of *Carcinoplax ischurodous* from South African waters:

BM 1928.12.1.104: Durban [29°51'S 31°01'E]; on a coral washed up, leg. Mr H. W. Bell Marley; 3/20, Stebbing collection; 1 male, cl 16 mm, cb 26 mm; holotype of *Geryon ischurodous* Stebbing.

SAM-A15289: off Natal, 27°14'S 32°54'E, 700–680 m, Agassiz trawl, 20 May 1976, R.V. *Meiring Naude* station SM 67; 1 male, cl 4,1 mm, cb 5,9 mm.

Synonymy of *Carcinoplax ischurodous*:

Geryon ischurodous Stebbing, 1923: 2, pl. 11. Barnard, 1950: 292, fig. 54k. Guinot, 1967: 276 [no record].

Geryon sp.: Kensley, 1977: 163.

THE SOUTH AFRICAN SPECIES OF *GERYON* SENSU STRICTO

Geryon chuni Macpherson, 1983

Figs 2, 3, 6C

Geryon quinquedens: Stebbing, 1905: 36; 1910: 313. Barnard, 1950: 291, fig. 54f–i [part.].

Geryon affinis: Takeda, 1976: 64, fig. S. Afr.–69 [colour]. [Non *G. affinis* A. Milne Edwards & Bouvier, 1894.]

Geryon chuni Macpherson, 1983: 23, figs 10–15, 17a–c.

Material

South West Africa–Namibia

RMNH (no number): off South West Africa–Namibia, 23°50'S 13°03,6'E, 761–768 m, mud, 30 May 1982, *Valdivia* I, station P–26; 1 male, 1 female.

South Africa

USNM 205337: Cape Columbine [32°49'S 17°51'E] region; 1 female. SAM–A19513: WNW of Dasseneiland [= Dassen Island, 33°26'S 18°05'E], 160–180 fms (293–329 m), 25 February 1965, collected by S. Kannemeyer; 1 female. SAM–A12073: off Dasseneiland, 165 fms (302 m); 1 male, 1 ovigerous female. SAM–A12207: west of Slangkop [= Slang Kop Point, 34°09'S 18°19'E], 200 fms (366 m), 24 February 1965, collected by S. Kannemeyer: 1 male, 3 females. BM 1928.12.1: Cape Point Lighthouse [Cape Point = 34°21'S 18°29'E], 470 fms (860 m), Stebbing collection; 1 male, 1 female, 3 juveniles. SAM–A836, A837, A1626: off Cape Point (three lots with different bearings combined), 345, 500, and 760 fms (631, 915, and 1 391 m); 6 juveniles. SAM–A675, A6075: off Cape Point Lighthouse (two lots with different bearings combined), 360 and 470 fms (659 and 860 m), S.S. *Pieter Faure*, stations P.F. 6004, 16655; 2 males, 2 females (1 ovigerous). SAM–A15385: west of Cape Point, 250 fms (458 m); 2 males, 1 female. USNM 228311: 34°49'S 18°17'E, 515 m, 1985, R.V. *Africana*, collected by R. Melville-Smith; 1 male, 1 female. SAM–A676, A681: off Table Mountain [33°58'S 18°25'E], 250 fms (458 m) and 39°49'S 21°14'E, 560 fms (1 025 m) (two different lots combined); 5 females (1 ovigerous). ZMC (no number): Agulhas Bank [35°30'S 21°00'E]; exchange from South African Museum; 2 males.

Description

A large *Geryon*, cl to 95 mm, cb to 114 mm in adults, with five anterolateral teeth on the carapace and laterally compressed dactyli on the walking legs. Carapace about 1,2 times broader than long. Median pair of frontal teeth

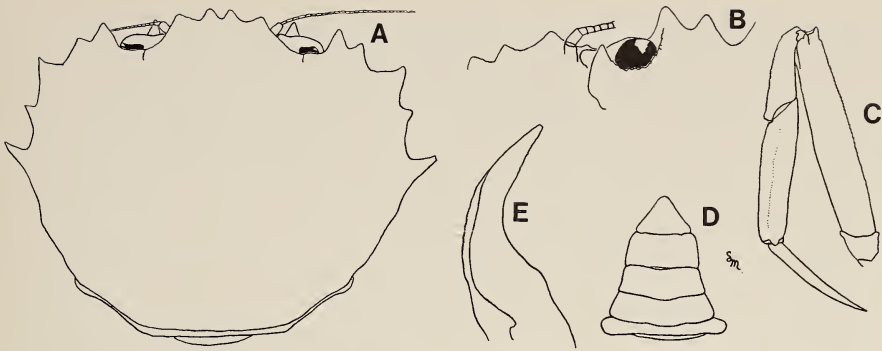


Fig. 2. *Geryon chuni* Macpherson, Agulhas Bank. A-D. Male, cl 24 mm. A. Carapace. B. Orbit, ventral view. C. Fifth leg. D. Abdomen. E. Male, cl 53 mm. Gonopod.

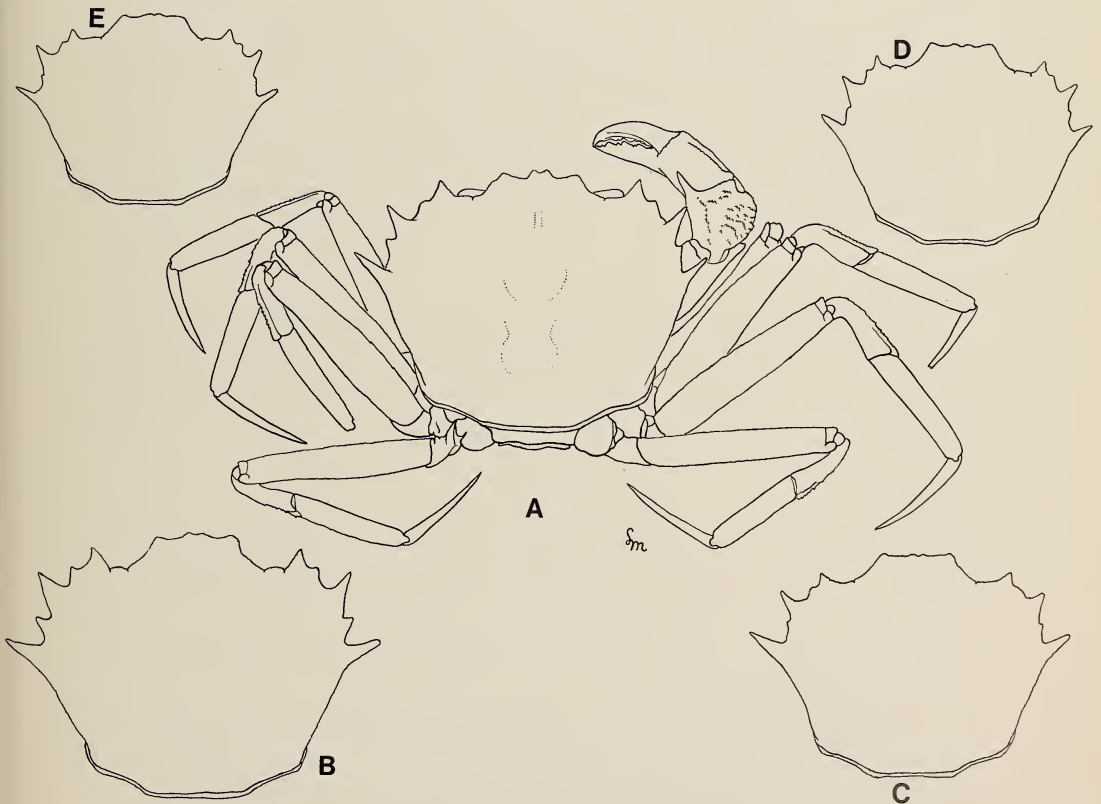


Fig. 3. Juveniles of *Geryon chuni* Macpherson, off Cape Point. A. cl 19,5 mm, dorsal view. B-E. Outline of carapace. B. cl 13 mm. C. cl 11 mm. D. cl 10 mm. E. cl 9 mm.

separated by deep V-shaped sinus. Distance between submedian frontal teeth less than distance between them and lateral frontal teeth. Second and fourth anterolateral teeth often obsolete in adults, fourth smallest of all; distance from first to third tooth less than that from third to fifth tooth. Carapace lacking distinct raised ridge mesial to fifth anterolateral tooth, granular posterolaterally, smooth dorsally. Suborbital tooth well developed, extending to level of lateral frontal teeth. Cheliped with sharp tooth subdistally on upper margin and with distal dorsal tooth or lobe on merus; carpus roughened dorsally, with distal outer spine or angled lobe, anterior margin smooth; propodus with at most distal angled projection. Meri of walking legs usually with distal, dorsal tooth or projection. Dactyli of walking legs compressed, height at midlength greater than width. Fifth leg: merus about 4,5 (range 3,8–5,2) times longer than high, length about half carapace width; carpus with line of denticles or low spinules dorsally; propodus length about four times height, subequal to dactylus in length (longer in some, shorter in others).

Size

Carapace lengths of males 24 to 92 mm, of non-ovigerous females 47 to 69 mm, of ovigerous females 54 to 65 mm, of juveniles 8,5 to 19,5 mm. Carapace widths of males 32 to c.100 mm, of non-ovigerous females 62 to 87 mm, of ovigerous females c.68 to 85 mm, of juveniles 12 to 26 mm. Macpherson (1983) reported the following range of measurements in his material: males, cl 51 to 114 mm, cb 61 to 95 mm; females, cl 56 to 73 mm, cb 68 to 86 mm; ovigerous female, cb 86 mm.

Depth range

The specimens were taken in depths ranging between 302 m and 1 391 m. Three records were from about 300 m, two from about 400 m, one from 500 m, two from 600 m, one from 700 m, three from about 900 m, one from about 1 000 m, and one from 1 391 m. All of the juveniles, cl 19,5 mm or less, came from depths in excess of 600 m.

Remarks

Adults of *G. chuni* can be distinguished at once from both *G. maritae* and *G. macphersoni* by the laterally compressed dactyli on the walking legs and by the larger suborbital spine. This species further differs from *G. maritae* in having a distinct dorsal spine on the meri of the walking legs, especially the posterior two pairs, it is a smaller species than either *G. maritae* or *G. macphersoni*, and it is a much smoother species than the latter.

At smaller sizes, differences in the shape of the dactyli of the walking legs become less clear. The series of juveniles from SAM-A836 all lack distal spines on the meri of the walking legs. The three juveniles from the lot of five specimens from the collection of the British Museum all lack distal spines on the meri of the walking legs as well as erect spinules on the carpi of the walking legs; the meral

spines are present, at least on the last legs, in the two larger specimens in the same lot.

The configuration of the carapace spines in several specimens from lot SAM-A836 are shown in Figure 3.

The specimens reported by Stebbing (1905, 1910) and Barnard (1950) were examined. Part of the material reported by Barnard, at least the specimens from off Cape Point, are identifiable with this species; his figure 54f-h probably is based on the juveniles from lot SAM-A836. His material from East London is referred below to *G. macphersoni* sp. nov. As Barnard did not list individual lots, it is not possible to determine exactly which specimens that he might have studied actually belong here, although it is likely that he saw all of the early specimens in the collection.

The range of *G. chuni* overlaps with that of *G. maritae* off South West Africa-Namibia and with that of *G. macphersoni* sp. nov. off South Africa. In the material examined, *G. chuni* was found together with *G. macphersoni* sp. nov. in the lots from off Dasseneiland in 293-329 m, that taken by the R.V. *Africana* in 515 m, that from off Slangkop in 366 m, and at Cape Columbine. According to R. Melville-Smith (in litt. August 1985), this species and *G. macphersoni* were taken together off Cape Columbine at 32°25'S 16°29'E, in 496 m.

The species reported from South Africa by Takeda (1976) probably is this species. His colour figure shows a reddish-tan crab with blunt anterolateral teeth and distal spines on the meri of the walking legs, and the dactyli of the walking legs appear to be compressed.

Distribution

Off south-western coast of Africa, from 23°50'S, off South West Africa-Namibia, to Agulhas Bank, South Africa.

Geryon macphersoni sp. nov.

Figs 4, 5, 6A-B

Geryon quinquedens: Barnard, 1950: 291, fig. 54f-i [*part.*]. Kensley, 1977: 163. Paula e Silva, 1985: 8 [p.p.]. [Non *Geryon quinquedens* Smith, 1879.]

Geryon sp.: Kensley, 1981a: 61; 1981b: 41 [no records].

Material

South Africa

SAM-A12206: holotype, WNW of Dasseneiland [= Dassen Island, 33°26'S 18°05'E], 160-180 fms (293-329 m), 25 February 1965, collected by S. Kanne-meyer; 1 male.

USNM 221699: paratype, ?off Cape Columbine [32°49'S 17°51'E], c. 500 m; 1 male. SAM-A19514: paratype, W of Slangkop [= Slang Kop Point, 34°09'S 18°19'E], 200 fms (366 m), 24 February 1965, collected by S. Kannemeyer;

1 male. USNM 228316: paratypes, 34°49'S 18°17'E, 515 m, 1985, R.V. *Africana* (R. Melville-Smith); 1 male, 1 female. ICM (no number): paratypes, 3 males, 1 female (data as for USNM 228316). SAM-A19515: paratype, off Table Mountain [33°58'S 18°25'E], 250 fms (458 m) and 39°49'S 21°14'E, 560 fms (1 025 m) (two different lots combined); 1 male. RMNH no. Crust.D.36594: paratype, off Cape Town, R. Melville-Smith; 1 male. SAM-A680: paratype, off Bashee River Beacon [Bashee River = 32°15'S 28°54'E], 300 fms (549 m), S.S. *Pieter Faure*, station P.F. 12650; 1 female (dry). SAM-A16773: paratypes, 32°15'S 29°09'E, 580 m, D.B. trawl, R.V. *Meiring Naude* station SM 233, 25 June 1979; 2 males, 2 females. SAM-A15890: paratype, 30°32'S 30°52'E, 900–625 m, beam trawl, R.V. *Meiring Naude*, station SM 121, 10 May 1977; 1 female. SAM-A15282: paratypes, off Natal, 28°21'S 32°34'E, 775–825 m, R.V. *Meiring Naude* station SM 38, 28 May 1975; 3 males, 1 female. ZMC (no number): paratypes, off Natal, 25°20'S 35°17'E, 680–730 m, sand bottom, *Galathea*, station 203, 21 February 1951; 1 male, 1 female.

Mozambique

RMNH no.Crust.D.36593: paratype, off Mozambique, P-51, I. Riera; 1 female.

Description

A large *Geryon*, cl to 105 mm, cb to 126 mm in adults, with five anterolateral teeth on the carapace and dorso-ventrally depressed dactyli on the walking legs. Carapace about 1,2 times broader than long. Median pair of frontal teeth separated by shallow sinus. Distance between submedian frontal teeth less than distance between submedian and lateral frontal teeth. Second and fourth anterolateral teeth reduced, fourth often completely obsolete, distance from first to third tooth subequal to distance from third to fifth. Carapace with distinct raised ridge mesial to fifth anterolateral tooth, and with strong granulation on branchial, cardiac, and protogastric regions, especially in males. Suborbital teeth low, falling short of level of lateral frontal teeth. Cheliped rough, surface with sharp, erect granules; upper margin of merus with sharp subdistal spine; carpus rough, anterior margin, lateral to inner spine, lined with sharp granules; propodus rough dorsally, unarmed distally, with an outer granulate ridge. Meri of walking legs usually with distal, dorsal spine. Dactyli of walking legs dorso-ventrally depressed, width near midlength greater than height. Fifth leg: merus 3,9 (range 3,6–5,0) times longer than high, with distal dorsal spine, length 0,5–0,6 carapace width; propodus with line of erect spinules dorsally, length about 3,5 times height, slightly longer than dactylus.

Size

Carapace lengths of males 23 to 105 mm, of females 30 to 83 mm; carapace widths of males 34 to 126 mm, of females 40 to 100 mm. Paula e Silva (1985) reported females with cb 105 mm and males with cb more than 120 mm from the population off Mozambique.

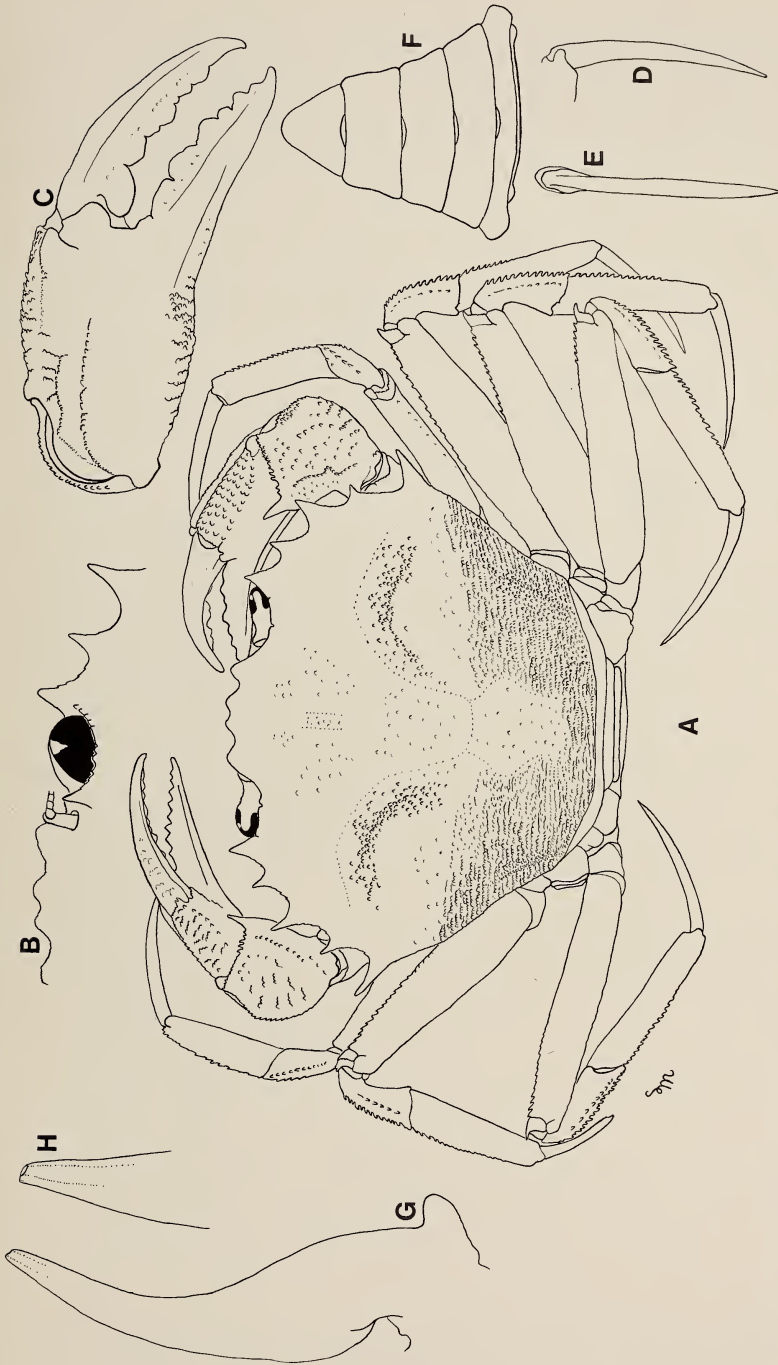


Fig. 4. *Geryon macphersoni* sp. nov. Off Natal. Male, paratype, cl 27 mm. A. Dorsal view. B. Orbit, ventral view. C. Chela. D. Dactylus of fifth leg, posterior view. E. Dactylus of fifth leg, dorsal view. F. Abdomen. G. Gonopod. H. Apex of gonopod.



Fig. 5. *Geryon macphersoni* sp. nov. Off Natal. Female, paratype, cl 30 mm. A. Carapace. B. Orbit, ventral view. C. Chela. D. Cheliped. E. Fifth leg.

Depth range

The specimens were taken in depths of 293–329 m to 900–625 m; intermediate depths included 366 m, 458 m, c. 500 m, 549 m, 580 m, 680–730 m, and 775–825 m. The smallest specimens were taken in depths of 900–625 m and 775–825 m. Paula e Silva (1985) reported that this species was taken in 250–850 m off southern Mozambique.

Remarks

This species can be distinguished from both *G. chuni* and *G. maritae* by the extent of granulation on the carapace, chelipeds, and dorsal margins of the walking legs. The smallest specimen of *G. macphersoni* examined is much rougher dorsally than the largest specimen we have seen of *G. chuni*. *Geryon macphersoni* resembles *G. maritae* and differs from *G. chuni* in having dorso-ventrally depressed dactyli on the walking legs. It further differs from *G. maritae* in having a distal spine on the meri of the walking leg, a distinct line of erect spinules on the carpus of the walking legs, and tubercles or denticles on the anterior margin of the carpus of the cheliped.

In roughness of the carapace, this species resembles *G. granulatus* Sakai (1978: 11) from Japan, and the Japanese species also has depressed dactyli on the walking legs. *Geryon granulatus*, however, lacks the distal spines on the meri of the walking legs and those legs are much smoother dorsally, and the carapace has a much more rounded shape and is more inflated dorsally as well.

Barnard (1950: 291) considered *G. paulensis* Chun (1903: 531), taken in 2 068 m, north of St. Paul and New Amsterdam, Indian Ocean, to be the juvenile of his *G. quinquedens*. That species, however, known only from the type, has compressed dactyli on the walking legs, which are very long and slender, and has very long first, third, and fifth anterolateral spines on the carapace. *Geryon paulensis* appears to be distinct from any of the species known from southern African waters.

The specimen recorded by Barnard (1950) from off East London [33°02'S 27°55'E] in 300 fms (549 m) is probably the specimen recorded here from off the Bashee River. The specimens reported by Kensley (1977, 1981a) were also examined and both are referable to this species.

This species apparently occurs together with *G. chuni* in the area around the Cape but has a much greater eastward distribution than *G. chuni*, which has not been taken from east of Agulhas Bank.

The specimen shown in Figure 5 has a branchial parasite on its right side. The male from off Cape Town carries small lepadid barnacles on the mesial side of the legs and the base of the carapace. The female from Mozambique shows two balanid barnacles on the right cheliped.

Etymology

We are pleased to dedicate this species to our colleague Enrique Macpherson of the Instituto de Ciencias del Mar, Barcelona, whose careful work has recently

revealed the existence of two previously undescribed species of *Geryon*, *G. chuni* and *G. erytheiae*.

Distribution

Southern Africa, from off Cape Columbine to 35°17'E, off Natal, and off Mozambique.

Geryon maritae Manning & Holthuis, 1981

Fig. 6D

Geryon quinquedens Beyers & Wilke, 1980: 9 [non *G. quinquedens* Smith, 1879].

Geryon maritae Manning & Holthuis, 1981: 112, figs 24a, 25, 26 [*part.*, not references to Doflein 1903, 1904 = *Geryon erytheiae* Macpherson, 1984]. Macpherson, 1983: 22, figs 16–17d. Melville-Smith, 1983: 123, figs 2, 3; 1985: 55, fig. 2 (left); 1986: 257, figs 1–3; 1987: 143 [p.p.].

Material

South West Africa–Namibia

MNHP (no number): off South West Africa–Namibia, 18°41,5'S 11°24,5'E, 480 m, 27 June 1971, 'Walda'–0067–CMO3; 1 male. USNM 205342: ?off South West Africa–Namibia, 19°30'S, 400 m; 1 ovigerous female. SAM (no number): just north of Lüderitz [26°39'S 15°09'E], 600 m; 1 male.

Description

A very large *Geryon*, adults with cl of up to 140 mm, cb to more than 160 mm, with five anterolateral teeth on the carapace and dorso-ventrally depressed dactyli on the walking legs. Carapace about 1,1 times broader than long. Median pair of frontal teeth separated by wide sinus, base of sinus at about level of lateral frontal teeth, submedian frontal teeth distinctly over-reaching lateral frontal teeth. Distance between submedian frontal teeth less than distance from each to lateral frontal tooth. Second and fourth anterolateral teeth greatly reduced, fourth often completely obsolete, distance between first and third tooth less than distance between third and fifth tooth. Carapace with short, oblique ridge on each side mesial to fifth anterolateral tooth. Surface of carapace variably granular, granulations particularly well developed on branchial regions. Suborbital spine very short. Cheliped with blunt subdistal lobe on upper margin of merus, but lacking distal projection there, carpus lacking outer spine, propodus lacking distal dorsal spine. Meri of walking legs with no trace of distal dorsal spine. Dactyli of walking legs dorso-ventrally depressed, width at midlength greater than height. Fifth leg: merus about four (3,8–4,3) times as long as high, length about two-thirds carapace width; carpus with irregularly tuberculate dorsal ridge, lacking line of erect tubercles; propodus length about four times height, shorter than dactylus.

Size

Carapace length of males 85 and 112 mm, of ovigerous female 82 mm. Carapace widths of males 97 and 131 mm, of ovigerous female 97 mm. Manning